EyeFind User Guide

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ABBREVIATIONS

AOI	Area of Interest
CSV	Comma Separated Value file
EPSG	European Petroleum Survey Group
JPEG	Joint Photographic Experts Group
KML	Keyhole Markup Language file
KMZ	Keyhole Markup Language files Zipped
NIR	Near Infra-red
PNG	Portable Network Graphic image format
TIFF	Tagged Image File Format
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator
WGS84	World Geodetic System 1984

1 INTRODUCTION

1.1 EYEFIND: AN INTRODUCTION

The purpose of this document is to provide the user with an insight on how to work with the EyeFind application. After reading this document, the user should know:

- How to search for imagery in RapidEye EyeFind application
- How to navigate through the base map
- How to get additional information about the results of a search
- How to save and restore search or query sessions

In case of questions or if any problems are encountered, please send an email to: eyefind@blackbridge.com

1.2 KNOWN LIMITATIONS

The following is a list of known limitations. We are currently working on solutions for these problems in future releases of EyeFind:

- Queries for level 1B data you may produce additional datasets in the results which are outside the defined area of interest.

1.3 GETTING STARTED WITH EYEFIND

The application can be found at: http://eyefind.blackbridge.com/

The following are system requirements for using the application:

- enabled JavaScript
- enabled cookies
- minimum screen resolution 1024 x 768
- Firefox version 2 or higher, or IE version 8 or higher

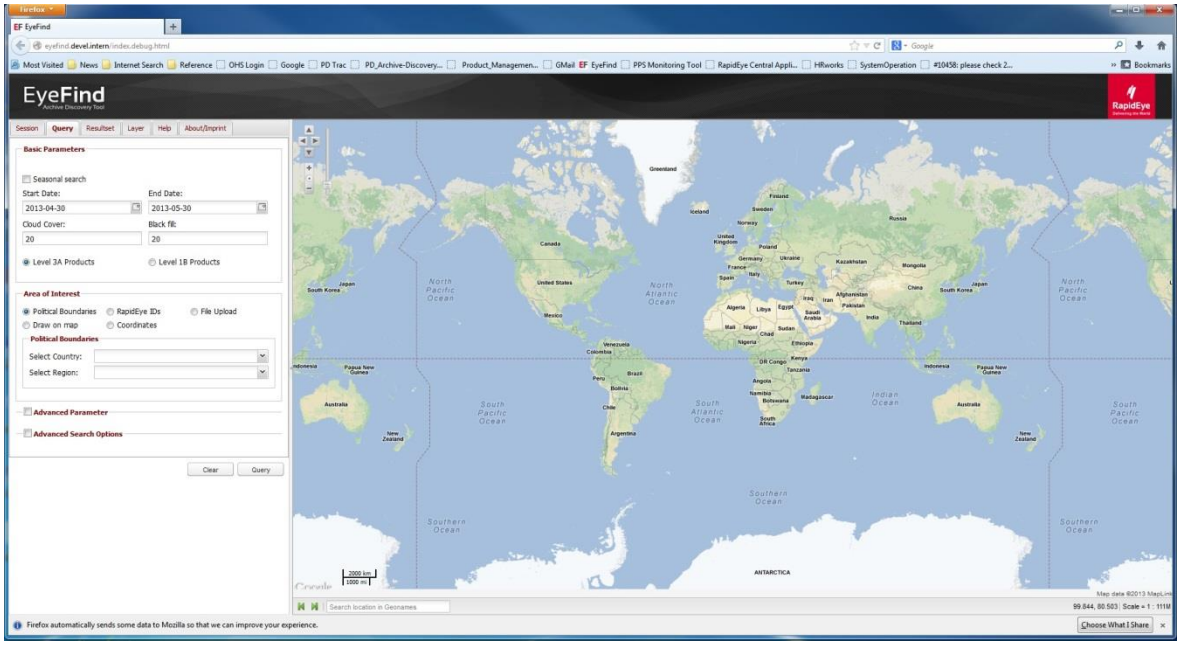


Figure 1: Overview of the EyeFind application web page

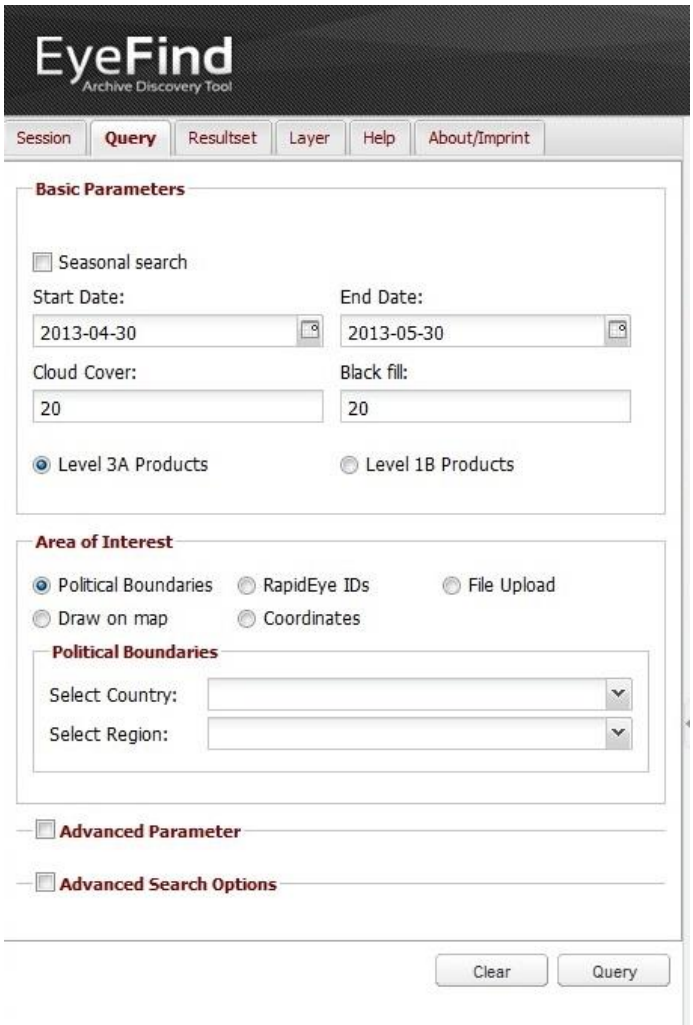


Figure 2: EyeFind Tab panel

2 SEARCHING THE RAPIDEYE ARCHIVE

To begin a search of the RapidEye archive using EyeFind, the search criteria must first be set. This can be done under the 'Query' tab which is visible upon opening the application (Figure 2). There, the following parameters can be defined:

- Basic Parameters
- Defining an Area of Interest (AOI)
- Advanced parameters settings
- Advanced Search Options

Each of these parameter groups is described in more detail in the following sections.

2.1. BASIC PARAMETERS

The Basic parameters needed for a search are described in the follow table.

NAME	DESCRIPTION
Start Date	The start date of your time of interest
End Date	The end date of your time of interest
Cloud Cover	The maximum acceptable percentage of cloud cover for a given image
Black Fill	The maximum acceptable percentage of black fill (non-imaged pixels) for a given tile (3A product search only)
Seasonal	If this box is checked, EyeFind will initiate the search for the given time window for every year, starting from the start date year till the end date year For example: Start date: 2011-01-01, and End date: 2013-02-01, will search for items from: 2011-01-01 to 2011-02-01, 2012-01-01 to 2012-02-01, and 2013-01-01 to 2013-02-01
Area of Interest	The geographic extent of the search query. There are several ways to define an Area of Interest (see below for details)
Product Type	Option are Level 3A (tiled, ortho product) or Level 1B (full image take, basic product)

Table 1: Basic Search Parameters

2.2. DEFINING AN AREA OF INTEREST (AOI)

There are several different ways to define an Area of Interest (AOI) for a search query. Depending on the selection of the mode, the input parameters change.

2.2.1. Political Boundaries

The option "Political Boundaries" allows the user to define the AOI by countries and their subordinate administrative regions, such as states or provinces. By using the pull down list, the user can select or type the name of the country desired to use for a search query. The administrative regions are reduced to the selected country once selected. The administrative region is an optional field.

2.2.2. RapidEye IDs

Selecting ‘RapidEye IDs’ allows the user to define the AOI by a list of either RapidEye tile IDs or catalog IDs. Both lists require the user to separate each selection by a comma and a space (example 1262009, 1460721, 1657404). If Catalog IDs are defined, the Start and End date fields are no longer required.

2.2.3. File upload

This option allows for the possibility to define the AOI by uploading a preexisting shapefile or KML/KMZ file. Use the "Browse" button to select the desired file from the local computer. The selected file must meet one of the following specifications:

Option 1:

- The file is a zip archive
- The zip archive contains at least the .shp and .shx file of a shapefile
- The zip archive may contain a .prj file which will be used to define the projection. If no .prj file is provided, geographic coordinates in WGS84 will be applied (EPSG code 4326)
- The shapefile must contain shapes of type POLYGON or MULTIPOLYGON
- The shapefile may contain one or many shapes

Option 2:

- The file is a KML or KMZ file
- The file must contain shapes of type POLYGON or MULTIPOLYGON
- The file may contain one or many shapes

2.2.4. Draw on Map

This option allows the user to draw a polygon AOI on the map. The default setting for this option is set to 'navigate' allowing the user to navigate to the correct location before starting to draw the AOI polygon. Once 'draw' is selected, the options 'Box', 'Circle' and 'Polygon' options become active allowing the user to draw boxes, circles and free hand polygons on the map.

One or more polygons can be drawn. If a polygon is lost, misplaced, or incorrectly drawn, it can be deleted by selecting the 'Delete last drawn polygon' button. To delete all drawn features at once, use the 'Delete all polygons' button.

2.2.5. Coordinates

This option allows the user the possibility to set the AOI with a box defined by the upper left (UL) and lower right (LR) corners. Each coordinate is defined in the range of -180 and 180 for the longitude and -90 to 90 for the latitude. Table 2 lists several options for defining an AOI using coordinates.

OPTION	DESCRIPTION
Decimal (Box)	The upper left and lower right corner of the bounding box must be provided in decimal degrees
DD-MM-SS (Box)	The upper left and lower right corner of the bounding box must be provided in sexagesimal degrees, e.g. in degree, minutes and seconds
Decimal (Point + Distance)	A coordinate pair in decimal degrees to define the center of the bounding box and a distance from this point which defines the approximate distance of the center point to the boundary of the bounding box must be provided
DD-MM-SS (Point + Distance)	A coordinate pair in sexagesimal degrees to define the center of the bounding box and a distance from this point which defines the approximate distance of the center point to the boundary of the bounding box must be provided

Table 2: AOI Coordinate Selection Options

2.2.6. AOI Size Calculation

The area of the AOI is calculated using the Geography datatype in Postgis. If multiple polygons are detected in the AOI, these polygons are merged. Projection used is EPSG code 4326 (Geographic, WGS84).

2.3. ADVANCED PARAMETER SETTINGS

2.3.1. Range Settings

The advance parameter settings allow the user to further constrain the search criteria by setting a defined range for each of the parameters listed in Table 3. If the minimum or maximum value is not given, the lowest or highest possible value will be taken for these parameters.

PARAMETER NAME	DESCRIPTION
Spacecraft View Angle	Spacecraft view angle is the across-track off-nadir viewing angle of the satellite (sensor) in degrees with "+" being East and "-" being West
Sun Elevation	The angle of the sun in degrees to the plane of the image at the image center
Sun Azimuth	The sun azimuth at the center of the image in degrees
Sun Azimuth Angle	Angle, in clockwise positive degrees from true north at the image center to the scan (line) direction at image center, in the range of 0.0 to 360.0
Missing Lines Band (1,2,3,4,5)	Percentage of missing data per band

Table 3: Advanced Parameter Settings

2.3.2. Bands

The 'Bands' section allows the user to define which color bands are desired for the image search with the default set to all available bands. All images which have **at least** those selected bands will be taken into account, meaning some of the resulting images might have more bands than those requested.

2.3.3. Spacecraft

The ‘Spacecraft’ section allows the user to define which spacecraft shall be taken into account for the search. If a spacecraft is checked, images which were taken by this spacecraft will be included in the result list.

2.4. ADVANCE SEARCH OPTIONS

The advanced search options are described in Table 4.

OPTION	DESCRIPTION
Lock AOI	The AOI of the previous search will be used in the current search and will remain until this checkbox is unchecked
Suppress quicklook layer	If this option is selected, the number of maximum results will be raised from 20,000 to 50,000
Limit number of results per tile	This option allows the user to define the maximum number of results returned per tile. In selecting this option, not all possible results for a tile will be shown, but only the best ones up to the number selected

Table 4: Advanced Search Options

3 MAP AND RESULT HANDLING

3.1. MAP NAVIGATION

Table 5 lists the available methods to zoom or pan around the map.

ACTION	BEHAVIOR
Mouse wheel	The mouse wheel can be used to zoom in and out. The position of the mouse pointer defines the point where the zoom will be centered
Shift + Drag a box	By pressing the shift button a box can be drawn with the mouse, which defines the new extent of the map. If the box does not fit into the map window the extent of the map will automatically be adapted to be entirely contained in the map window
Slider bar	The slider bar in the top left corner of the map allows the user to zoom in and out of the map. Zooming will occur around the center of the map
Pressed mouse button	Left click on the map and hold the mouse button down, drag the cursor to the desired location and release

Table 5: Map Navigation Options

3.2. LAYER MANAGEMENT

The displayed map layers can be managed under the tab 'Layer' on the left side of the application window. Here the user can:

- Switch on and off layers by checking or unchecking the applicable boxes with the changes being applied immediately to the map
- Change the drawing order of the layers by dragging the layers with the mouse to the desired position

3.3. ADDITIONAL MAP INFORMATION

The following additional information is displayed on the map:

- The coordinates on the lower right corner of the map show the coordinates of the mouse pointer in decimal degrees
- The scale in kilometer and miles is indicated in the lower left corner. Please note that they will be approximate values since the map is shown in geographic coordinates

4 RESULTS ANALYSIS

Upon the successful completion of a query, the 'Resultset' tab automatically opens to display results in a table. The Resultset table displays the following information:

NAME	DESCRIPTION
Image	A thumbnail of the image
Functions	Additional selections which trigger a dataset specific function (see next section)
Acquired at	The acquisition date of the dataset
Clouds	An estimation of the percentage of the tile covered by clouds (not black fill)
Black fill	The percentage of the tile containing black fill
Catalog ID	The catalog ID of the dataset

Table 6: Fields of the Resultset Table

The search functionality looks for the best images that meet the specified parameters. Those images which have been automatically selected as the best are displayed on the map and appear in the table with the box checked. All other results for a given tile are displayed in the table unchecked. These results will not be displayed on the map unless the user manually selects them. For tiles with more than one image selected, the image displayed on the map will correspond to the first checked image. To display images on the map that are further down the image list, then upper most image must be deselected.

4.1. RESULT SET FUNCTIONS

Table 7 describes the button functions located in the Resultset table.

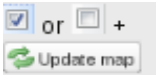
FUNCTION	DESCRIPTION
	Each dataset can be switched on and off as desired by selecting or de-selecting the checkbox in the first column of the table. After making this selection, the "Update map" button at the top of the table must be clicked before the new results are displayed on the map
	This button opens a separate window which displays a quicklook of the image at a higher resolution, along with additional information (metadata) about the image (see "Image Metadata" section for more details)
	By clicking this button the map will zoom to the extent of the associated image
	By clicking on this button the extent of the associated image will be highlighted on the map. Only the extent of the last selected image is shown on the map. To remove the highlighted feature, choose the 'Layer' tab and deselect the layer "Highlighted Feature"

Table 7: Result Set Functions

The functionality of the map and table works interchangeably with the functions of the Resultset. Additionally, by simply clicking an image on the map, the application will automatically scroll the table to the desired image.

4.2. DATASET FUNCTIONS

At the top of the 'Resultset' tab there are several buttons which allow operations to be performed on the entire

search dataset. Table 8 describes the actions of each button.

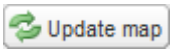
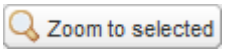
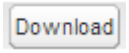
FUNCTION	DESCRIPTION
	This button allows the user to redraw the map taking into account all images which are currently selected in the table. The extent of the map will not be changed by this function, and this is only required to redraw the map after a manual change has been made to the image selection
	This button allows the user to redraw the map to the extents of all images which are currently selected
	This function allows for the queried catalog metadata to be downloaded for further analysis. Only metadata for checked images will be included in the download process. The following download options exist: ▪ **Catalog IDs:** A file containing the catalog IDs of the selected images separated with a comma and a space (.csv) ▪ **Result Shapefile:** A shapefile containing the extent of all selected images as a single shape (contiguous or non-contiguous) in the shapefile ▪ **AOI Shapefile:** A shapefile containing the extents of the AOI used in the search ▪ **KML:** A kml file containing the extent of all selected images, each as one feature in the kml file ▪ **Quicklooks:** A zip archive containing all quicklooks of the selected images ▪ **Image format:** An image which shows the content of the current map with all currently enabled layers and with the same extent as used in the map. Available formats are 'jpeg', 'png' or 'geotiff' ▪ **Image width:** Width of the produced images in pixels. The default is the width of the map which is displayed in the web browser ▪ **Image height:** Height of the produced images in pixels. The default is the height of the map which is displayed in the web browser ▪ **E-Mail:** Email address to use for notification when the desired information is ready for download as a zip file. If an email address is not entered, the user will receive a zip file for download directly One or more options can be selected for download. The download delivers a zip archive which contains all files for the selected options. The user can then select the following buttons: ▪ Submit: Sends the request for the desired information ▪ Clear: Clears all entries in the input fields ▪ Close: Closes the download window
	This function allows the user to send a request for quote to the RapidEye Support team. By clicking this button, a window opens which allowing the user to enter some contact information.
Select/Deselect all items	By checking this box at the top of the results table, all result sets (including those which are not shown in the current table page) will be selected or deselected

Table 8: Dataset Functions

4.3. IMAGE METADATA

Table 9 lists the metadata fields that are displayed for each image along with the quicklook

NAME	DESCRIPTION
Catalog ID	Unique catalog number identifying the image
Tile ID (Level 3A data only)	Tile ID as defined in the RapidEye tile grid
APS Image Take ID	A unique identifier of the parent image (mainly used for internal purposes)
Continent (Level 3A data only)	Name(s) of the continent(s) on which the tile is located
Country (Level 3A data only)	Name(s) of the country/countries in which the tile is located
Administration unit (Level 3A data only)	Name(s) of the administrative region(s) in which the tile is located
Left upper longitude	Longitude of the left upper corner of the extent of the image
Left upper latitude	Latitude of the left upper corner of the extent of the image
Unusable data percentage (Level 3A data only)	The percentage of the tile which is either blackfill or covered with clouds
Black fill (Level 3A data only)	The percentage of the tile which is blackfill, intersected with the corresponding image take. They may appear as pixels with a value of “0” or as “noData” depending on the viewing software
Effective cloud coverage	Cloud coverage percentage for the image (not including black fill)
Spacecraft View Angle	Across-track off-nadir viewing angle of the satellite (sensor) in degrees with "+" being East and "-" being West
Azimuth Angle	Angle, in clockwise positive degrees from true north at the image center to the scan (line) direction at image center, in the range of 0.0 to 360.0
Sun Azimuth	Sun azimuth at the center of the image in degrees
Sun Elevation	Sun elevation at the center of the image in degrees
Space Craft ID	ID of the space craft which took the image
Missing Lines Band (1,2,3,4,5)	Percentage of missing data per band

Table 9: Image Metadata Field

5 SESSION UTILITIES

This section provides details on how to restore the last session, save query results and share them with other people, as well as how to restore and delete sessions. The described functionality can be found under the 'Session' tab.

5.1. RESTORE LAST SESSION

If the web browser is closed without saving the session, this button allows the user to restore the last search.

5.2. QUERY 1B TO 3A FUNCTION

This button turns a query of image take tiles (Level 3A Ortho product) to image takes (1B Basic product) query and vice versa. The original AOI will be preserved.

Note: *Subsequent query conversions after the first conversion may not return the results of the initial query exactly.*

5.3. SAVE SESSIONS

This functionality allows query settings and the result set to be saved at any point in time. Type in a name for a session to be saved in the 'Session Name' box, this will be the name under which the session is stored and under which you can retrieve it later. Next, select the 'Save' button to save the session on the server. A URL should appear in the 'Saved Session' portion of the tab.

5.4. LIST OF SAVED SESSIONS

At the bottom of the 'Session' tab a list of all saved sessions is located. All sessions older than 30 days will automatically be removed from the server and will not show up any more in this table. The table displays the following data per session:

NAME	DESCRIPTION
Name	The name of saved session. If the same name is entered several times, a version number will be added to the name of the session
Created	The date and time at which the session has been created
Actions	Icons to restore and delete the session
URL	URL of the session

Table 10: Saved Session Information

5.5. SHARE SESSIONS

To share the results of a query with another person, send the URL of the desired session once a session has been saved. The new user can then open the URL in a browser and the results of the search will be loaded.

5.6. RESTORE SESSIONS

If the URL of a pre-existing session is known, it can be pasted into a browser to restore it. Additionally, by selecting the 'Session' tab and locating the desired session in the 'Saved Sessions' table, clicking on the first icon in the Actions column will restore the session.

5.7. DELETE SESSIONS

To delete a session, locate the right session in the table 'Saved Sessions' and click the second icon in the Actions column of the corresponding session.